

# Emergency Medical Care as a Comprehensive System

JOHN J. HANLON, MD

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*Dr. Hanlon is Assistant Surgeon General and Coordinator for Public Health Programs, Health Services Administration. This paper is based on a speech he gave at the IVth International Congress on Emergency and Ambulance Medicine, held in Budapest, Hungary, May 9-12, 1973. Tearsheet requests to John J. Hanlon, MD, Room 18A-30, Parklawn Bldg., 5600 Fishers Lane, Rockville, Md. 20852.*

AMONG the many critical areas in health care, the appalling amount of disability and loss of life from sudden catastrophic illness and accidents is one of the most visible. From highway accidents alone, if the current trend continues, the nation will experience its two millionth traffic fatality by 1976. This figure almost equals the total population of the American colonies when they achieved their independence, 200 years ago. Each year there are about 55,000 traffic deaths and 2 million highway injuries, one-tenth of which result in permanent disability. The toll from nonhighway accidents is no less alarming—more than 64,000 deaths each year plus 9.3 million nonfatal injuries, a quarter of a million of which are permanently disabling (1, 2).

Some studies indicate that as many as 15 million children sustain significant accidental injuries each year, and about 16,000 die (3). Currently, accidents kill more people in the productive age groups up to 39 years than any other single factor and are the fourth largest cause of death after that age. The costs of accidental death, disability, and property damage are estimated at about \$29.5 billion a year (2). A distressing fact about this

carnage is that studies have demonstrated that 15 to 20 percent of accidental highway deaths could be avoided if prompt, effective care were available at the scene of the emergency, on the way to the hospital, and in the hospital (4, 5).

The situation with regard to sudden medical emergencies is no less disconcerting. These emergencies include coronary occlusions, cerebrovascular strokes, diabetic crises, precipitous miscarriages or deliveries, and various other sudden critical events. The American Heart Association estimates that approximately 10 to 20 percent of the 275,000 prehospital coronary deaths could be prevented if proper care were administered at the scene and en route to a medical facility (6). Huntley (7) has estimated that prompt and proper emergency care for victims of the following illnesses and accidents could save about 60,000 lives annually.

<i>Cause of death</i>	<i>Number</i>
Myocardial infarction .....	35,000
Vehicular accidents .....	12,000
Other trauma .....	6,000
Stroke .....	2,500
Poisonings, drownings .....	2,500
Other .....	2,000
Total .....	60,000

The amount of suffering, disability, and lost income that could be avoided is impossible to estimate. In addition, there is perhaps the most ignored component of emergencies—the psychiatric one (8, 9), which includes suicidal and homicidal attempts, battered children and spouses, destructive manic states, and drug and alcoholic crises. Thus, a sudden medical emergency is an unforeseen event which affects a person in such

a manner as to require immediate medical care (physical, physiological, or psychiatric).

Persons in need of emergency medical assistance usually are confused about where to seek services and thus lose vital time in obtaining care. In many communities, all emergency patients transported by public ambulance services are carried to the municipal hospital, frequently bypassing other hospitals that could provide the needed services. The patient is thereby denied prompt access to the service he needs. For the patient with a heart attack, severe respiratory distress, or extensive bleeding, the difference in time may be vital. Dr. Robert Baker, director of the Trauma Unit at Cook County Hospital, Chicago, claims that for every 30 minutes that elapse between the time of an accident and when the patient receives definitive care, the mortality rate increases threefold.

### The Problem

The status of all aspects of emergency medical care resources in general leaves much to be desired. There are gross inadequacies in planning, training, equipment, and especially coordination. To approach the problem perhaps backwards, there has been a duplicative and often wasteful proliferation of emergency rooms (not necessarily emergency departments) regardless of need. Often they seem to have been established to meet hospital accreditation standards or to provide a base of inpatients.

Three-quarters of the 5,130 community hospitals with emergency facilities have fewer than 200 beds. Only 10 percent are equipped to handle all medical and surgical emergencies; only 14 percent can handle psychiatric emergencies, much less drug crises. Fewer than half have blood banks, and 58 percent are not equipped to handle cardiac emergencies. Only 6 percent are able to communicate with the ambulances or rescue vehicles that serve them. As Seeley (10) of the National Academy of Sciences-National Research Council has emphasized, "Many of the smaller hospitals don't even have the emergency equipment we recommend for ambulances." Only 17 percent have 24-hour physician coverage. Many rely upon "on-call" physicians who are theoretically available around the clock and who are presumably, but by no means always, qualified to handle properly all emergency cases (11). Regionalization and categorization of medical facilities would ameliorate many problems if, in

addition, the public and ambulance services personnel were informed about which facilities to use and for what purpose (12).

In 1972, there were more than 50 million patient visits to hospital emergency facilities in the United States. The number has been increasing by 10 percent each year. One-third of the visits are not actually for emergency care. The patients come because health care is accessible 24 hours a day, because they have limited funds, or because they have nowhere else to go. The emergency department load is increasing as the costs of health care increase, access to private physicians becomes more difficult, home visits become more rare, and residential locations change more frequently.

There is a serious need, therefore, for the use of triage in emergency departments to determine (a) which patients have true emergencies and need immediate care, (b) which patients have urgent conditions but can wait for treatment several hours without harm, and (c) which patients are using the emergency facility as an ambulatory care clinic. To improve the quality of emergency care, alternative methods of providing access to care need to be developed for nonemergency patients.

Some of the most glaring deficiencies in the emergency medical picture relate to ambulances: lack of ambulance coverage, poor vehicular design, inadequate equipment for treatment and extrication of trapped accident victims, and inadequate or no communication between the professional persons and the institution which is to receive the patient (13). An ambulance should be an extension of a well-staffed and equipped hospital emergency department (14). More important than immediate transportation is the immediate lifesaving care—control of hemorrhage, splinting fractures, keeping the breathing passages open. On-the-site care should be by trained emergency technicians, and then the transportation should be deliberate and gentle. This is the theory, but what is the practice?

Of the 44,000 ambulances in the nation, only about 1,300 are operated by hospitals; 4,500 are operated by fire or police departments, 4,700 by commercial firms, 11,000 by volunteer groups, and 19,000 by morticians. The term "ambulance" is often a misnomer. Almost one-half of the vehicles were not intended for use as ambulances. One-tenth are panel trucks or vans, one-quarter

are station wagons, many are actually hearses, and of the 36 percent that are conventional ambulances, many are too low and too cramped to permit in-transit patient care.

Fewer than one-third of the ambulances carry all the equipment recommended by the American College of Surgeons. Equipment on most ambulances consists merely of an oxygen tank and a mask; fewer than one-half have bag-mask resuscitators. Often there are not even splints, backboards, or airway or intravenous equipment. Only a small percentage carry cardiac defibrillators (15), and telemetric equipment for long-distance monitoring of vital signs is rare indeed. In fact, 38 percent do not have two-way radio communications (11), while fewer than 6 percent of the vehicles are equipped to communicate with a hospital.

### Personnel

Each of the 44,000 ambulances requires an average of five attendants to cover the various shifts—a total of 220,000 persons. The various professional organizations concerned have recommended that each ambulance be manned by two emergency medical technicians who have completed at least 70 hours of instruction plus 10 hours of emergency room training. By 1970, only about 5 percent had obtained this minimum recommended training. About 57 percent had achieved the advanced first-aid course, 33 percent had had the standard 10 to 12 hour first-aid course or equivalent, and 5 percent had no training (7). Ambulance drivers especially are lacking in training. They are typically inadequately paid; hence, the turnover tends to be high and the quality low.

Under these circumstances it is not surprising that, as estimated by the Ambulance Association of America (6), about 25,000 persons are permanently injured or disabled each year by untrained ambulance attendants and rescue workers. Also, the accident rate for ambulances at intersections is twice that of other vehicles. To operate an ambulance on a 24-hour basis for a year costs approximately \$90,000. This includes capital investment, maintenance, repairs, garaging, equipping, and staffing. Used properly, the ambulance would return the investment in it many times over; thus it merits efficient and careful use. Many conscientious persons concerned with rescue and transport of patients have

been taking ever stronger steps to improve both equipment and personnel. The Ambulance Association of America in cooperation with professional groups and government agencies has been notable in this regard. With reference to personnel qualifications and training, the National Registry of Emergency Medical Technicians has been established as a national accreditation organization.

Consideration of emergency vehicle attendants focuses attention on the broader subject of related personnel. Several years ago there were an estimated 300,000 allied health workers of various types in the emergency medical care field. This number falls far short of the need, and much must be done to attract, develop, and hold desirable workers. New types of personnel must be tried, legal barriers to their effective use must be removed, roles must be defined, appropriate curriculums must be planned and presented, and positions must be established with proper career development opportunities.

A difficult and costly problem is the provision of a sufficient number of trained and qualified physicians for this critical aspect of community medicine. Many medical graduates have had no formal training in emergency care. A survey in the late 1960s of 108 medical schools in the United States and Canada showed only 33 with courses in the subject. At present, about 15,000 physicians are devoting most of their time to emergency medicine. Twice that number is needed, but not every physician is qualified. A special type of training is needed. In July 1970, the first residency in emergency medicine was established at the University of Cincinnati Medical Center. Since then several other centers of medical education have followed suit.

Several professional organizations are among the leaders in emergency medicine—the American College of Surgeons, the American Academy of Orthopaedic Surgeons, the American Association of Anaesthesiologists, and the newer University Association of Emergency Medical Services and the American College of Emergency Physicians. The ACEP, now with about 3,000 members, has been working to improve specialty training in acute care and to make it a board-certified specialty. Another important effort to improve the quality of care was the formation in 1971 of the Emergency Department Nurses Association (EDNA).

## The Deterrent To Solution

The consensus of persons concerned with the emergency care problem is that it need not exist—that the technology, the expertise, and even the resources are currently available to insure efficient, effective, and acceptable emergency medical services to all who need them. This situation differs from problems such as cancer, where much more research is required before control becomes possible. In the final analysis, the deficiency in emergency care is in the unwillingness or inability of professions, institutions, agencies, and units of local government to coordinate and use their joint existing resources and capabilities and in the failure of the State and Federal governments to coordinate their resources and efforts to eliminate duplication, waste, and needless legal barriers. A question frequently raised is: Why is it possible to send men to another planet and back and monitor and protect their health—literally by the second—but not possible to duplicate this feat within a radius of a few miles? The answer, of course, is clear. A tremendous amount of intensive planning and effort went into the space program. It was done comprehensively, with a systems analytic approach.

By contrast, the following examples of lack of planning, cooperation, and systematic approach in the emergency medical field are the rule rather than the exception: hospitals individually developing emergency departments independently of each other and unrelated to ambulance services; satisfactory communications equipment in ambulances but not in hospitals; good equipment but no trained personnel; satisfactory hospitals and ambulances, but no means of access to the system or no central dispatch; good on-site and in-transit care but no preparation at the hospital; bypassing a hospital with a coronary care unit to deliver a cardiac patient to an inappropriate or ill-equipped and staffed institution; no ambulance service beyond a city's limits or at night; and either no ambulance or several at once with attendants arguing as to who gets the patient. Examples are legion and common knowledge.

## The Emergency Medical Services System

An emergency medical services system (16–20) should be an organized procedure for receiving and acting upon requests for assistance when there is a likelihood of either trauma that requires prompt medical or surgical attention or an illness that poses conditions which threaten life or re-

quire immediate resuscitation to sustain life. It usually requires a communications system to receive requests for help from many sources and locations; a defined procedure for acting upon the requests, including central dispatch and alerting actions; availability of an appropriately staffed transportation system or systems by land, air, or water; and a capability for immediate on-site treatment and in-transit life support.

There must also be available 24-hour, 7-day-a-week emergency care centers prepared to receive emergency patients from within a defined service area. They must be staffed with trained professional and technical personnel and equipped with supportive laboratory, diagnostic, and treatment facilities. Such centers may be either in large general hospitals as part of their emergency service function or in independent and free-standing specialized institutions for trauma care. Under certain circumstances mobile emergency treatment units have been found useful as ancillary emergency care resources.

All emergency treatment centers should be intimately related to appropriate specialized capabilities. Most important is for the emergency medical services system to be regarded as an integral part of the total health care system to assure proper recovery and rehabilitation of emergency patients.

## Phases of an EMS System

The following list presents in sequence the events that can follow occurrence of a damaging incident that produces emergency medical patients. It is recognized that not all those concerned with the subject would agree with all of its aspects. Some would combine certain of these events and others might subdivide the list further. It provides, however, a reasonable enumeration of points where medical emergency system failures may exaggerate rather than prevent losses from damaging incidents. Many of these steps are not recognizable as separate entities in response to certain kinds of medical emergencies. Many of them are ineffective in situations where medical science cannot help the victim regardless of where he is taken. The medical needs of the victim must determine the manner of system response.

### Pretreatment phase

1. Occurrence
2. Detection
3. Notification
4. Dispatch of mobile emergency medical services
5. Travel to site

### **Preliminary care phase**

6. On-site problem analysis
7. On-site treatment
8. On-site extrication
9. On-site stabilization
10. On-site loading
11. Selection of definitive care facility
12. Transport (continuing patient maintenance)
13. Enroute notification of receiving facility
14. In-transit transmission of patient's condition and receipt of necessary life-maintenance instructions and their application
15. Facility preparation for receiving patient
16. Delivery to definitive care facility

### **Definitive care phase at receiving facility**

17. Patient transfer
18. Information transfer
19. Patient evaluation (by facility staff)
20. Triage
21. Continuation of treatment
22. Second-stage diagnosis
23. Emergency room treatment
24. Intensive care
25. Definitive diagnosis
26. Definitive treatment

### **Recuperation phase**

27. Recuperative care

### **Rehabilitation phase**

28. Transfer to extended care facility or home
29. Rehabilitative treatment
30. Discharge
31. Return to normal function
32. Periodic followup

## **Criteria, Standards, and Regulations**

A basic problem in the delivery of emergency medical services in the United States is the absence or inconsistency of personnel qualification requirements and of criteria, standards, guidelines, and regulations for EMS systems. As has been indicated, until now responsibility has rested essentially with local communities with some assistance and support from State and Federal governments. However, to achieve maximum utilization and efficiency and to provide high-quality continuous patient care, local systems must be compatible with those adjacent to them. Uniform qualifications, criteria, standards, and regulations must be adopted. Specific subject areas in which needs exist are the following:

- Categorization of emergency facilities
- Criteria for ambulance design and equipment
- Model ordinances for the regulation of ambulance services
- Ambulance and emergency department report forms
- Uniform standards for training—
  - Emergency medical technicians (ambulance)

Emergency room personnel  
Certification of emergency medical technicians

The Public Health Service and others have provided a number of recommended standards for reference and guidance. Some of them are summarized as follows (21):

### **State legislation should (22)—**

Establish divisions of emergency medical services  
Specify duties and qualifications of personnel  
Require establishment of a system to supervise and regulate ambulance services and personnel  
Assist in establishment of a coordinated central communications and dispatch system

### **Ambulances should (23, 24)—**

Meet the vehicle design specifications recommended by the National Academy of Engineering, National Research Council  
Have as minimal equipment those items recommended as essential equipment by the American College of Surgeons  
Exist in sufficient numbers and be so placed as to provide maximum utilization and effectiveness in the shortest possible response time

### **Ambulance personnel should (25–29)—**

Have basic training of at least 70 hours instruction, plus 10 or more additional hours of emergency room training  
Routinely maintain skills by observation and instruction in a hospital emergency department under the supervision of a physician, including regular critique by emergency room physicians, in company with ambulance personnel, of care administered to the patient prior to his arrival at the emergency room

Meet or exceed requirements of the Registry of Emergency Medical Technicians—Ambulance

Have two emergency medical technicians, one of whom may be the driver, to staff each emergency ambulance

### **Hospital emergency facilities should (12, 30)—**

Promote the development of satisfactory plans for regionalization of services

Be categorized according to National Academy of Science's recommended criteria

Provide for ongoing self-improvement training for all emergency department staff, both clinical and administrative

Meet or exceed the emergency department standards recommended by the Joint Commission on Accreditation of Hospitals

Accept a leadership role in providing training for emergency medical technicians

Base ambulance services at the hospital, wherever and whenever feasible

### **Communications (13)—**

A single telephone number for emergency medical services, such as 911, should be instituted throughout the nation

Central dispatch should be provided for all emergency ambulances

Radio or environmentally secure communications should exist between (a) central dispatch centers, (b) ambu-

lances, (c) hospitals, (d) law enforcement and fire units, and (e) emergency operating centers

#### **Supportive actions—**

Toll-free public telephone services should be available for all emergency calls from pay telephones

Emergency medical identification (31,32)—to be carried by all persons with conditions or medical histories which should be known to anyone rendering emergency medical care

At least one member of every family should be trained in medical self-help (33) or Red Cross first aid or both

Highway signs (34), coordinated with hospital categorization, should be placed in adequate numbers and locations to identify emergency medical care facilities

Obviously, additional criteria, standards, and regulations are needed in other aspects of emergency medical services, and provision should be made for modification of existing qualifications, criteria, standards, and regulations when necessary.

### **Data Collection and Analysis**

To introduce effective planning and systems changes which are economically sound, a national data collection and analysis system (35, 36) must be implemented. At a minimum, the following information should be collected and analyzed prior to implementation of large-scale EMS system efforts:

Epidemiologic data concerning medical emergencies

Geographic, demographic, and topographic data

Patient-flow patterns

Patient-demand patterns

Road networks

Travel times (ground and air)

Population densities

Distances from health care resources

Health care resources should be analyzed by—

Type: (a) personnel—physicians and allied professionals and technicians, (b) emergency centers, hospitals and related facilities, (c) ambulance services (ground, air), and (d) communications networks

Category

Location

Distribution

Services provided

Capacity

Capability

Availability

Manpower: quantity, training, and staffing patterns

Equipment

Administration and control: government, public, private enterprise, and volunteers

Response times

Needs

Priorities

All the aforementioned factors must be analyzed and evaluated in order to plan efficient and effective

response systems which are suitably located and which properly use, maximize, and expand existing resources. If this evaluation is not done, the resulting system could place on a community a tremendous psychological and socioeconomic burden which would be a detriment to good patient care.

### **Public Education**

The education, understanding, cooperation, and intelligent action of the general public is essential to any successful EMS system. The public must be made aware of what is being done, who is doing it, and for what purpose. In addition, it must be informed of the services available, steps to take when a medical emergency is encountered or recognized, and who and how to call for assistance. Extensive experiments in the use of a common emergency telephone number have been conducted in the United States. Where such a number is available, the necessary assistance can be dispatched immediately because the central dispatcher knows current service-load levels and the location of the closest appropriate medical facility and response vehicle. The public must be educated to use the universal emergency number.

### **EMS Councils**

At present there is little coordination among providers of EMS services in the United States. Ambulance services operate essentially independently of hospitals. Hence, patients may be delivered to hospitals which have not been advised of their pending arrival, condition, or need for emergency treatment. Similarly, there are few central dispatch facilities to coordinate ambulance usage and patient flow according to situational needs. Training and acceptance of EMS personnel at all levels differ greatly from community to community and service to service. Communications and medical equipment differ considerably from vehicle to vehicle, and few procedures have been established for exchange of ambulance and hospital equipment upon delivery of a patient so that ambulances can return promptly to further service. There is little or no uniformity in reporting forms and procedures either among ambulance services or hospitals. Essentially, there is no standard or uniform peer review or evaluation procedure of the medical care provided to each patient. Few communities have established inter-hospital radio communications systems or inter-

hospital agreements for systematic continuation of care in case of patient transfer.

Many of the foregoing problems are in the process of being corrected by community EMS councils (37). Typically, these councils are comprised of representatives from the community and the various elements of the EMS system—hospital administrators, public health agencies, medical societies, law-enforcement and fire-protection personnel, private ambulance operators, disaster preparedness personnel, and others. The councils have the authority and responsibility by virtue of new laws or local ordinances to search out and bring together the resources and to coordinate the services provided by all elements of the system. In other words, EMS councils offer the potential of establishing and implementing an orderly, efficient, and well-coordinated system for delivering emergency medical care.

### **Current Status on the National Level**

At present there is no national unified system for total planning, organizing, implementing, operating, and regulating emergency medical services. Instead, there are a variety of arrangements, each unique in character. Each attempts to meet the demands of the particular geographic area it serves, essentially through a somewhat loose interaction among its component parts (physicians, hospitals, rescue squads, private ambulance companies, and law-enforcement and fire-protection agencies). Until recently, few successful attempts were made to develop an effective, coordinated, and comprehensive emergency medical system that uses objective and scientific planning and management technology.

Until now, the environment has not been receptive to deliberate total planning or to the provision of adequate public financial resources necessary to effect comprehensive EMS delivery. During recent years, however, stimulated by nationally sponsored comprehensive health planning programs and regional medical programs of the Department of Health, Education, and Welfare, the National Highway Traffic Safety Program of the Department of Transportation, the model cities program of the Department of Housing and Urban Development, and others, the components of local, regional, and State jurisdictions have begun to plan and work much more closely and effectively. Increasingly, State and Federal governments have recognized their responsibilities for providing pro-

fessional and material support, coordination, and technical and financial assistance to local communities in order that they might more adequately fulfill their responsibility.

In response to the recommendations of many individuals and nationally prominent groups, and in recognition of the acute need for improved emergency medical services, the President of the United States in his State of the Union message of January 1972 directed the Secretary of Health, Education, and Welfare to develop new ways of organizing and providing comprehensive emergency medical care. This directive resulted in the initiation by DHEW of a coordinated Federal approach to meet the problem, and the following actions were taken:

1. The establishment in DHEW of a national focal point for EMS to provide technical consultation and guidance to States, communities, professional organizations and facilities, citizen organizations, and others to assist them in developing quality emergency medical care.

2. The establishment of a Federal interagency committee for interdepartmental coordination to improve EMS planning, funding, performance, and evaluation.

3. The development of an EMS information system with two primary duties: (a) information collection, storage, and retrieval and (b) information dissemination, including the development and production of publications and promotional materials, as well as response to inquiries.

4. The development of an EMS data collection, analysis, and evaluation system which will be coordinated with data systems of other governmental and nongovernmental agencies. This system should eliminate wasteful and confusing duplication of effort and provide data for meeting requirements of all participating organizations. It will include (a) the development of EMS computer models, (b) research data for assessing the efficacy of local management approaches to EMS, (c) research data for assessing the use of different types of equipment and procedures within an EMS system, and (d) the collection of national data necessary for national decisions and policies relative to future programs and priorities.

5. The sponsorship of a limited number of comprehensive EMS systems for research and demonstration purposes. It is intended that they will be models to demonstrate the systems approach to EMS in different types of situations, combining

the application of existing technology and good management.

Additionally, the U.S. Department of Transportation (DOT) has developed, implemented, and funded training courses for medical technicians throughout the nation. DOT has also provided funds for the purchase of ambulances and equipment in many localities. Both the training courses and the ambulances and their equipment meet the recommended standards of the National Academy of Sciences-National Research Council.

### **Role of Helicopters in Emergencies**

During recent years, an increasing number of areas in the United States and elsewhere have resorted to the use of helicopters as an adjunct to their emergency medical service systems. This use has been spurred by the successful use of helicopters in conjunction with trained medical corpsmen in combat areas, as well as by the convenient availability of the flight equipment primarily for traffic control and other purposes. The degree of usefulness and success has varied (38).

While properly designed, equipped, maintained, and staffed helicopters may be extremely valuable and sometimes critically important under certain circumstances, their use must be very selective. As Dr. Dawson Mills, Director of the National Highway Traffic Safety Administration's emergency medical program, has stated (39): "The troubles with helicopters are twofold. First, they're no good in an urban environment. They can't land amid traffic jams, high-rise apartments, and power lines. Their usefulness begins 30 miles outside cities. Secondly, they're too expensive for most agencies. The helicopter alone can cost \$130,000—without the crew's salary." Meticulous maintenance and three complete crews for 24-hour service greatly increase the cost. As a result, only in rare circumstances can anything but a multi-purpose helicopter and crew be considered feasible. The following illustrates one such special circumstance.

Since July 1970, three Federal Government agencies have co-sponsored a program known as M.A.S.T. (Military Assistance to Safety and Traffic). This program uses Department of Defense (DOD) medical corpsmen and medical evacuation helicopters stationed at a number of demonstration sites to supplement whatever local EMS delivery system exists. Each is coordinated by a civilian EMS committee according to a local plan. Initial community contact and continuing

technical assistance are provided to the communities by regional representatives of DHEW and DOT. The program is coordinated at the Federal level by a three-man M.A.S.T. Interagency Coordinating Committee with representatives from DOD, DHEW, and DOT. By means of this cooperative program, patients in critical condition, medical personnel, equipment, and supplies have been transported by M.A.S.T. helicopters. While many of the missions involve interhospital transfers of critically ill patients, M.A.S.T. also provides first response to medical emergencies and traffic accidents when use of a ground vehicle is not feasible.

### **Conclusion**

An effective, efficient, and acceptable emergency medical service program must be built upon a comprehensive systems approach, and it must include the following:

- Clearly defined and delineated delegation of responsibility, authority, and procedures
- Systematic planning, organization, administration, and operation
- Uniform criteria, standards, regulation, and legislation
- Coordination of efforts and resources
- Increased skilled manpower
- Uniform training programs for all levels of EMS personnel
- Increased and properly distributed quantities of equipment, vehicles, and facilities
- Uniform communications networks and dispatching procedures
- Uniform data collection and analysis
- Public education
- Implementation of standard evaluation and reporting systems

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